

544, 147

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
19 August 2004 (19.08.2004)

PCT

(10) International Publication Number  
**WO 2004/070104 A1**

(51) International Patent Classification<sup>7</sup>: **D06M 11/54**,  
13/224, 15/21, 15/263, 15/333, 13/395, 15/564, 15/643

(21) International Application Number:  
PCT/IT2004/000041

(22) International Filing Date: 5 February 2004 (05.02.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
MI2003A000201 6 February 2003 (06.02.2003) IT

(71) Applicant (for all designated States except US): **MAS-  
SIMO\_GUARDUCCI S.R.L.** [IT/IT]; Via Toscana  
29/29A, I-59100 Prato (IT).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **GUARDUCCI, Mas-  
simo** [IT/IT]; Via Dei Casini, 61, I-59100 Prato (IT).

(74) Agent: **PIPPARELLI, Claudio**; Studio Cioni & Pippar-  
elli, Via Quadronno, 6, I-20122 Milano (IT).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-  
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,  
GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,  
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR PREVENTING THE SHRINKAGE OF WOOLEN OR WOOL BLEND FABRICS

(57) Abstract: Method for preventing the shrinkage of woollen or wool blend fabrics during water washing treatment, comprising the initial impregnation of the fabric of interest with a reducing product ( compound A) and after suitable mechanical and drying treatment, the subsequent contact of the resulting fabric with a blend of products comprising at least one compound of each of the following groups: vinylic and acrylic resins, ethylene vinyl acetates, blocked or non-blocked isocyanates, blocked or non-blocked in water and solvents polyisocyanates ( compound B); blocked or non-blocked in water and solvents polyisocyanates (compound C); silicon emulsions, macro-emulsions, cationic fabric conditioners ( compound D).



WO 2004/070104 A1

“METHOD FOR PREVENTING THE SHRINKAGE OF WOOLEN  
OR WOOL BLEND FABRICS

\* \* \*

The present invention relates to a method for preventing the shrinkage of woollen or wool blend fabrics during water washing operations. This method substantially comprises a treatment of the fabric of interest with suitable blends of chemical products, which, in turn, form an integral part of the invention.

Woolen or wool blend articles are normally dry-cleaned to eliminate greasy dirt, but a perfect cleaning is not obtained with respect to common dust, unfortunately to the detriment of people suffering from allergies; furthermore, exhalations of the products used in dry cleaning cause water and atmosphere pollution (law of December 28, 1993 nr. 549 modified by the law of June 11, 1996 nr. 315). In return, water washing certainly offers greater hygiene but does not guarantee that the woollen or wool blend article does not modify its structure.

The Applicant has now found, and this is the object of the present invention, that it is possible to give dimensional stability to woollen or wool blend fabrics by means of treatment with suitable combinations of chemical products, which also form an object of the present invention. Articles manufactured with the fabric thus treated can be subjected to water washing at a temperature of about 30/40°C in specific laundry machines or household washing machines, preventing macroscopic felting.

Chemical processes are known for conferring unshrinkability to woollen articles, but they are only a few of these which normally refer to knitted or combed fabrics. Chemical treatment

used for anti-felting processes are substantially the following:

- degradation processes (oxidation, in particular), which are effected using chlorine or organic derivatives of chlorine in an aqueous medium: this treatment causes more or less damage to the woolen fibers, such as weight loss, a reduction in mechanical resistance, a decrease in the elasticity, all unfavorable changes on the final result of the fabric (normally called "feel");
- additional processes, by applying polymers such as polyamines, polyacrylates, reactive polyolefins;
- processes deriving from the combination of those mentioned above.

The method set up by the applicant and which, as already mentioned, constitutes an object of the present invention, makes use of a suitable combination of known techniques and, at the same time, applies these techniques by using a particular combination of chemical products which confer unshrinkability to woolen fabrics and do not produce any of the undesired side effects which, according to the known art, derive from the use of the above-mentioned chemical products on the woolen fabrics.

An object of the present invention therefore relates to a method for preventing the shrinkage of woolen or wool blend fabrics during water washing treatment, consisting of subjecting the fabric of interest to a combined action of a reducing product and a further three products to be added in a subsequent phase, and sending the fabric thus treated to suitable squeezing and finishing operations.

This treatment, in addition to preventing the macroscopic felting of the article during washing in household washing machines, also prevents the final deterioration of the fabric, which is inevitable in the treatment of the known art, and, finally, also allows the heaviest woolen articles, such as jackets, trousers and overcoats, to be treated.

In particular, the present invention relates to a method for preventing the shrinkage of woolen

and wool blend fabrics during water washing operations which includes the initial impregnation of the fabric of interest with a reducing compound and, after suitable mechanical and drying treatment, subjecting the resulting fabric to the action of a blend of products comprising at least one compound for each of the following groups:

- vinylic and acrylic resins, ethylene vinyl acetates, blocked or non-blocked isocyanates, blocked or non-blocked in water and solvents polyisocyanates;
- blocked or non-blocked in water and solvents polyisocyanates;
- silicon emulsions, silicon micro-emulsions, macro-emulsions, cationic fabric conditioners.

The fabric thus obtained is finally mechanically treated and dried.

The reducing compound (compound A) is selected from sulfites, di-sulfites and formiates; a single compound can be used, or a mix of two or more substances at various concentrations and percentages.

With respect to the compounds adopted for carrying out the second phase of the treatment, these are used, according to different percentages, in a mix whose combination is, in turn, an object of the present invention. This combination, as mentioned, uses at least one compound for each of the above-mentioned groups which, once again, are:

- Compound B: vinylic and acrylic resins, ethylene vinyl acetates, blocked or non-blocked isocyanates, blocked or non-blocked in water and solvents polyisocyanates;
- Compound C: blocked or non-blocked in water and solvents polyisocyanates;
- Compound D: silicon emulsions, silicon micro-emulsions, macro-emulsions, cationic fabric conditioners.

The above products, as such or in blends of suitable percentages, are put in contact with the fabric to be treated in amounts of up to 50% by weight with respect to the total weight of the fabric. The treatment is effected on the fabric, before manufacturing the items of clothing, and

is substantially inserted in the finishing steps of the fabric.

The method according to the present invention comprises the treatment of fabric in several steps:

- the fabric is impregnated with compound A at a temperature ranging from 0°C to 100°C;
- the fabric thus treated is subjected to squeezing or centrifugation, then dried;
- the fabric thus obtained is impregnated with compound BCD at a temperature ranging from 0°C to 100°C. When the BCD compound is a blend, the products are present in various percentage ratios, whose value is selected by experts in the field on the basis of the results to be achieved;
- finally, the fabric is squeezed and/or centrifuged and dried.

The following example will add further details to and contribute to providing a better illustration of the method according to the present invention, without, however, limiting its scope.

#### EXAMPLE

##### 1<sup>st</sup> Step

The treatment or pad bath is heated to a temperature ranging from about 20°C to 100°C (fig. 1) in the presence of one or more products selected from the reducing compounds, care being taken not to create stress in the warp and ensuring that the bath penetrates inside the fabric and not only on the surface, consequently exerting a pressure of 40-50 bar by squeezing or basket centrifugation.

The fabric is dried at a temperature of 110-120°C over the drying stenter (drying machine).

The fabric is fed to the stenter machine – care being taken not to exceed a height of 5/10 cm in the stenter machine above the height of the finished fabric, as this can create too much stress – until the fabric reaches its regular warp tension, subsequently recovering its initial conditions in dimensional terms (before step 1 of the treatment).

The fabric leaves the stenter machine dried.

## 2<sup>nd</sup> Step

The fabric is inserted into an intermitted barrel decatizing machine with "molleton" or "glazing finish" supplying vapour for 4 minutes, continuously, with no pump, care being taken that there is no locking or stress in the warp or in a KD machine.

It is recommended to mark two signals at about 1 meter from the headboard in the warp direction. The reciprocal distance between the signals should be 100 cm, to control the operation and prevent locking or stress. This control should be effected for all productions, in order to discover working methods which can generate undesired stress and consequently make the desired corrections.

The fabric thus treated can then be submitted to the necessary finishing operations.

It should therefore be dried again, with the usual precautions for weave stress and warp overfed to the maximum, the distances of the two signals being constantly restored to 100 cm, as described above.

## 3<sup>rd</sup> Step

The pad bath is prepared again for the second combination of products, consisting of one or more products selected from B, C and D; the drying phase in the stenter machine is then effected, care being taken to observe all methods and precautions already mentioned in Step 1 and 2. The fabric is vaporized and rolled up.

For the treatment in question, the tank (fig. 1) should be equipped with a minimum of three and a maximum of five cylinders, situated, respectively: nr. 1 immersed in the bath and nr. 2 out of the bath; nr. 3 immersed in the bath and nr. 2 out of the bath. The bath temperature ranges from 20 to 100°C.

The contact of the fabric with the cylinders has a sponge effect, the liquid penetrates inside the depth of the fabric and is definitely dried with various types of equipment.

## CLAIMS

1. A method for preventing the shrinkage of woolen or wool blend fabrics during water washing treatment, comprising the initial impregnation of the fabric of interest with a reducing product (compound A) and, after suitable mechanical and drying treatment, the subsequent contact of the resulting fabric with a blend of products comprising at least one compound of each of the following groups:
  - vinylic and acrylic resins, ethylene vinyl acetates, blocked or non-blocked isocyanates, blocked or non-blocked in water and solvents polyisocyanates (compound B);
  - blocked or non-blocked in water and solvents polyisocyanates (compound C);
  - silicon emulsions, macro-emulsions, cationic fabric conditioners (compound D).
2. The method for preventing the shrinkage of woolen or wool blend fabrics according to the previous claim, wherein the reducing product (A) consists of one or more compounds selected from sulfites, di-sulfites and formiates.
3. The method for preventing the shrinkage of woolen or wool blend fabrics according to claim 1, wherein the products selected from A, B, C and D, as single compounds or as blends of more compounds, are put in contact with the fabric to be treated in a total amount of up to 50% by weight with respect to the total weight of the fabric.
4. The method for preventing the shrinkage of woolen or wool blend fabrics according to claim 1, wherein the two treatments with the above-mentioned products are carried out at temperatures ranging from 20 to 100°C.
5. Blend of compounds to be used in a treatment for preventing the shrinkage of woolen or wool blend fabrics during water washing operations, comprising at least one compound of each of the following groups:

- vinylic and acrylic resins, ethylene vinyl acetates, blocked or non-blocked isocyanates, blocked or non-blocked in water and solvents polyisocyanates;
- blocked or non-blocked in water and solvents polyisocyanates;
- silicon emulsions, macro-emulsions, cationic fabric conditioners.



# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IT2004/000041

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 D06M11/54 D06M13/224 D06M15/21 D06M15/263 D06M15/333 D06M13/395 D06M15/564 D06M15/643		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 D06M		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 056 788 A (LUEDEMANN SIMPERT ET AL) 2 May 2000 (2000-05-02) examples	5
X	WO 01/75214 A (CHROBACZEK HARALD ; LUEDEMANN SIMPERT (DE); ANGELE THEODOR (DE); CIBA) 11 October 2001 (2001-10-11) examples 4,5,7,8	5
A	GB 1 259 595 A (IWS NOMINEE CO LTD) 5 January 1972 (1972-01-05) page 1, line 9 - line 21 examples	1-5
A	US 3 498 740 A (CAIN JAMES PALMER) 3 March 1970 (1970-03-03) examples	1-5
<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search  9 July 2004		Date of mailing of the international search report  16/07/2004
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer  Fiocco, M

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IT2004/000041

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6056788	A	02-05-2000	DE	19708632 A1	10-09-1998
			DE	19743639 A1	08-04-1999
			AU	726773 B2	23-11-2000
			AU	5644598 A	10-09-1998
			EP	0863249 A2	09-09-1998
			IL	123321 A	11-01-2001
WO 0175214	A	11-10-2001	DE	10016610 A1	11-10-2001
			AT	264936 T	15-05-2004
			AU	772238 B2	22-04-2004
			AU	5039801 A	15-10-2001
			BR	0109803 A	21-01-2003
			CN	1422305 T	04-06-2003
			DE	60102910 D1	27-05-2004
			WO	0175214 A2	11-10-2001
			EP	1268918 A2	02-01-2003
			US	2003155547 A1	21-08-2003
GB 1259595	A	05-01-1972	AT	304441 B	10-01-1973
			BE	728087 A	16-07-1969
			CA	922497 A1	13-03-1973
			CH	531608 B	15-12-1972
			CH	194269 A	
			DE	1905824 A1	27-05-1970
			DE	1906514 A1	28-08-1969
			ES	363889 A1	16-12-1970
			FR	2001530 A5	26-09-1969
			FR	2001630 A1	26-09-1969
			GB	1185813 A	25-03-1970
			NL	6901865 A	12-08-1969
			NL	6901971 A	12-08-1969
			SU	373963 A3	12-03-1973
			US	3511888 A	12-05-1970
			US	3676057 A	11-07-1972
US 3498740	A	03-03-1970	BE	695453 A	14-09-1967
			FR	1513989 A	16-02-1968
			GB	1181373 A	18-02-1970
			LU	53191 A1	16-05-1967
			NL	6703851 A	15-09-1967
			US	3687605 A	29-08-1972